

DESCRIPTIONS OF ADDITIONAL NEW WORLD TRICHOGRAMMATIDAE
(HYMENOPTERA): THE GENUS *NICOLAVESPA* AND A NEW
SPECIES OF *HAECKELIANIA*

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Abstract.—New taxa of Trichogrammatidae from the New World are described. Included is the **new genus** *Nicolavespa* with two **new species**, *N. theresae* and *N. luiseno*, and a **new species** of *Haeckeliana*, *H. sperata*. *Nicolavespa theresae* is widespread in North America; the closely related *N. luiseno* is known only from southern California. *Haeckeliana* is one of the most speciose genera of Trichogrammatidae although few species have been described. *Haeckeliana sperata*, from Dominica, attacks eggs of Curculionidae and is a potential biological control agent against the *Diaprepes* root weevil.

Key Words: Hymenoptera, Trichogrammatidae, *Nicolavespa*, *Haeckeliana*, *Diaprepes* root weevil

Described below are three new species of Trichogrammatidae. Two belong to the new genus *Nicolavespa*, a group ranging throughout much of North America as far south as Costa Rica. Although relatively widespread and sometimes locally abundant, the genus has not been collected previously. All specimens are derived from relatively recent collections. The hosts of *Nicolavespa* are unknown. The third species described belongs to the unrelated genus *Haeckeliana* Girault. The purpose of this isolated species description is to provide a name for a species from Dominica associated with an on-going biological control project by Jorge Peña (University of Florida) to suppress the *Diaprepes* root weevil (Curculionidae) on citrus and other crops in Florida (Hall et al. 2001). It also provides the opportunity to call attention to the characteristics and considerable species diversity of *Haeckeliana*, a genus heretofore known only from a single described species in the New World.

Descriptive terminology follows earlier papers (Pinto 2004, Pinto and George 2004). Acronyms for antennal sensilla and setae, based largely on terms used for *Trichogramma* (Olson and Andow 1993, Pinto 1999), include APB (aporous sensillar trichodea B, socketed), PLS (sensilla placodea), BPS (basiconic peg sensilla), FS (flagelliform setae or multiporous pitted sensilla trichodea A, unsocketed), UPP (uniporous pit pore sensilla trichodea D), and APA (aporous setae A, unsocketed). The UPP refers to a single sensillum at the apex of the female club. The flagellum of the antenna includes anellar (A), funicular (F) and club (C) segments. The medial and lateral surfaces of the antennae refer to 'inner' and 'outer' facing surfaces, respectively, when they are directed forward. Acronyms for wing venation are SMV (submarginal vein), PM (premarginial vein), MV (marginal vein) and SV (stigmatal vein) (Fig. 9). As in earlier papers, OL refers to ovipositor length and HTL to hind tibial length. Body

length measurements are taken from card-mounted material; all other measurements are from specimens on slides. Card-mounted specimens were dried with Hexamethyldisilazane ('HMDS', Heraty and Hawks 1998). Quantitative data for several measurements are reported as means followed by the range.

Nicolavespa Pinto, new genus

Type species: *Nicolavespa theresae* Pinto, n. sp.

Diagnosis.—Antenna (Figs. 4–7) with two funicular segments and three club segments; F1 short, transverse, closely appressed to F2; F2 more elongate, subcylindrical; club of female with a distinct apical process. Foretibia without spines on dorsal surface. Forewing (Fig. 9) with setal tracts distinct including RS1; SV well defined. Male genitalia (Figs. 12–15) with aedeagus indistinct from genital capsule apically but with apodemes present basally; volsellae well developed, subspatulate apically; parameres apparently absent; with a pair of strong ventral setae at base of volsellae.

Description.—Female (Figs. 1–2). *Head* (Fig. 3): Relatively broad, as wide as greatest mesosomal width. Eyes purple. Antenna with anellus and funicle each with two segments (Fig. 5), club three segmented; surface of pedicel smooth, that of funicle and base of club longitudinally wrinkled; A2 partially fused to F1; funicular segments closely appressed, F1 distinctly wider than long and much shorter than F2; F2 elongate, subcylindrical; last club segment with an elongate apical process (Fig. 6). Maxillary palp one-segmented. *Mesosoma* (Fig. 8): Midlobe of mesoscutum and scutellum each with two pair of moderately long setae. Propodeal disk not produced. Mesophragma notched apically. Foreleg without prominent spines on dorsal surface. Forewing (Fig. 9) moderately broad, slightly less than $2\times$ as long as wide; MV straight, contacting wing margin its entire length,

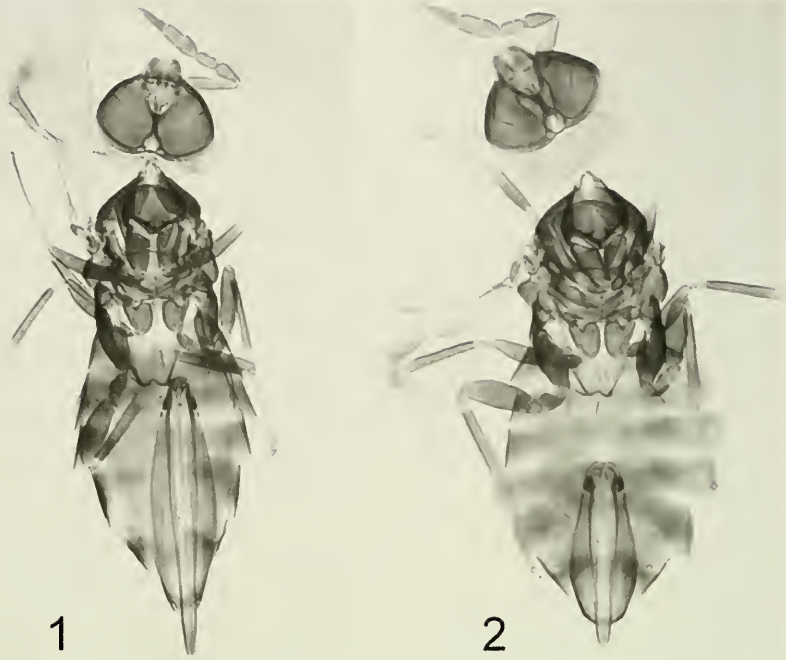
gradually increasing in width from base to apex, ca. $1.5\times$ as long as PM, ending abruptly at juncture with SV; PM narrowly separated from MV, angling posteriorly and forming a narrow costal cell; SV distinct, ca. half length of MV, constricted between stigma and MV. Hind wing with three setal tracks. *Metasoma*: Ovipositor moderately elongate, distinctly longer than hind tibia, not produced appreciably beyond apex of metasoma. Hypopygium short.

Male. Similar to female except antennal club without an apical process (Fig. 7); last metasomal sternum broadly divided medially. Genitalia (Figs. 12–15) short, subconical, tapering to apex, with aedeagus indistinct from genital capsule in apical half but apodemes distinct basally; anterodorsal aperture, wider than long, confined to basal third of capsule; ventral surface with subspatulate volsellae, the volsellae with a presumed single digital spine laterally; parameres apparently absent (see Discussion); a pair of strong ventral setae at base of volsellae; a short apically bifid protrusion dorsally near apex (Fig. 12).

Etymology.—Derived from the name of my father, the late Nicola Pinto, and vespa, Latin for wasp. Gender, feminine.

Discussion.—*Nicolavespa* is superficially similar to *Chaetostricha*. Both are rather slender, with moderately broad wings and similar venation. As in *Nicolavespa* the antenna of *Chaetostricha* consists of a two-segmented funicle and a three-segmented club. Also in both the F1 is short, transverse and appressed to a longer, subcylindrical F2. Unlike *Nicolavespa*, *Chaetostricha* lacks an apical process on the female club, usually has a dorsally spinose foretibia, a narrower head, and its male genitalia are considerably more reduced: the aedeagus is completely fused to the genital capsule, aedeagal apodemes are not present, and volsellae also are absent (see Viggiani 1971).

Similarity notwithstanding, *Nicolavespa* is not close to *Chaetostricha*. In the family classification of Viggiani (1971), based largely on male genitalia, *Nicolavespa* is as-



Figs. 1–2. *Nicolavespa* ♀ (venter in focus). 1, *N. theresae*. 2, *N. luiseno*.

signed to the Trichogrammatinae. *Chaetostricha* is a member of the Oligositinae as currently defined. Instead, *Nicolavespa* appears allied with *Lathromeris*. In both, the antenna has seven flagellar segments and the female club bears an apical process. Also, wing dimensions and venation are similar. *Lathromeris* is separated by its five segmented club, lack of an RS1 setal track on the forewing, and presence of a well developed hypopygium (Doutt and Viggiani 1968). Although similar in general appearance, the male genitalia of *Lathromeris* appear to lack volsellae.

Certain structures of the male genitalia in *Nicolavespa* are not readily homologized. Thus, it is not clear if parameres are present. They either are absent or represented by the pair of spines at the base of the volsellae (Fig. 13). The bifid subapical protrusion on the dorsum of the capsule (Fig. 12) has not been noted in other trichogrammatids. Because it is not observed under the

light microscope its presence in other taxa would easily escape detection.

Nicolavespa runs to couplet 37 with *Chaetostricha* and *Zagella* in the key to North American Trichogrammatidae (Pinto 1997). It is separated from both by the elongate apical process on the female club, and the presence of aedeagal apodemes.

***Nicolavespa theresae* Pinto, new species**
(Figs. 1, 4–7, 9–10, 12–14)

Description.—Female. Body length 0.70 (0.60–0.85) mm ($n = 10$); HTL = 0.20 (0.15–0.24) mm ($n = 11$); metasoma length (excluding slight ovipositor extension) ca. 1.75× that of mesosoma; metasoma gradually narrowing posteriorly, attenuate in apical half. *Color*: Variable (see Variation) but type series dark brown except as follows: upper face and vertex orange brown; antenna light brown, apical club segment distinctly darker; ventral half of epimeron yellow; notauli, metanotum, propodeal disk,

metasoma with basal two terga, and posterior portion of terga VI and VII yellow brown to light brown; legs lighter at base of femora and at base and apex of tibiae, tarsi lighter; forewing moderately infusate behind venation. *Head*: Almost as long as wide; scrobes extending half the distance from toruli to median ocellus. Antenna narrow, arising at level of ventral margin of eye; relative length/width of scape, pedicel, funicle and club as follows: 4.2 (3.8–4.7), 2.0 (1.7–2.1), 1.5 (1.3–1.8), 4.6 (4.3–5.0); scape narrow, elongate, narrower in apical half; pedicel ca. $0.5\times$ length of scape; F1 twice as wide as long and slightly less than half length of F2, funicular segments closely appressed, subequal in width, funicular width ca. $0.75\times$ that of club; club narrow, subfusiform, C1 and C2 subequal in length, C3 narrowly subconical, ca. twice length of C1; apical process of club elongate, comprising ca. a third total length of C3. Distribution of antennal sensilla on funicle and club as follows: F1 and F2—APB and APA; C1—FS, APB, APA and 1–2 PLS, C2—FS, APA (on few individuals) and 2 PLS; C3—FS, 4 PLS, apical process with 1 short APB near base and a short, stout UPP at apex; apex of each funicular and club segment with subglobose BPS, a relatively broad circle of shallowly impressed surface surrounding base of each BPS. Maxillary palp with apical peglike sensillum elongate, cylindrical, ca. $0.4\times$ length of terminal seta.

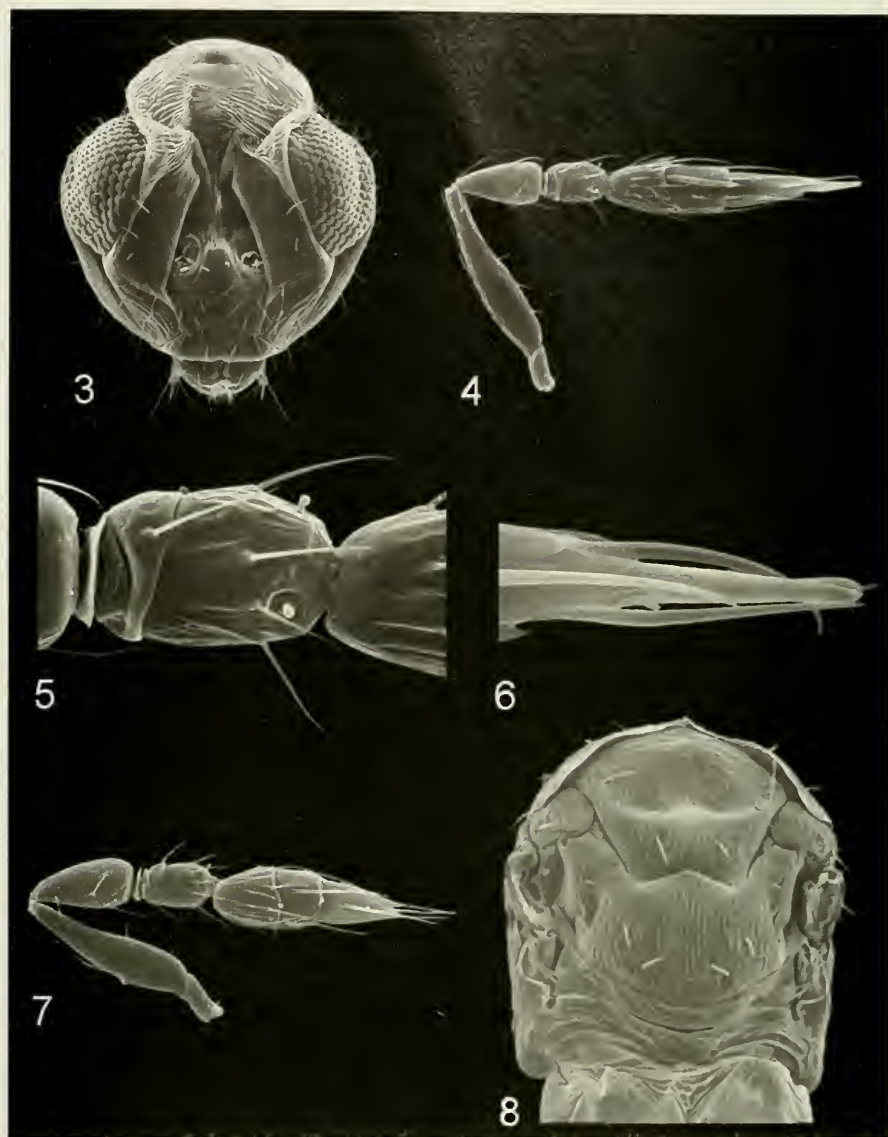
Mesosoma: Midlobe of mesoscutum almost as wide as long, ca. $1.6\times$ as long as scutellum; midlobe and scutellum with imbricate sculpturing; sculpted cells varying in dimension, subrectangular laterally, narrow and elongate medially, most cells with low transverse ridges within, imbrication most pronounced anteriorly on midlobe. Forewing moderately broad, widest near apex, $1.9\times$ as long as wide, fringe setal length $0.15\text{--}0.20\times$ wing width (see Variation); venation occupying 0.5 wing length; relative length of SMV, PM, MV and SV = 17: 9: 11: 5.5; SV moderately constricted

between stigma and MV; stigma angled toward wing apex; PM with two setae; MV with six dorsal setae (three marginal, long; three posterior, shorter) and five-six ventral setae. Forewing membrane moderately densely setose, with 14–15 linear setal tracks, with a field of ca. 20 alar acanthae on ventral surface at base. Hind wing with three setal tracks, posterior-most track with shorter setae, and not quite attaining apex of wing.

Metasoma: Last tergum relatively elongate, ca. half as long as wide, with cercal setae usually not reaching ovipositor apex (Fig. 10). Ovipositor elongate (Fig. 1), occupying almost entire length of metasoma (in slide-mounted specimens ovipositor length subequal to length of metasoma to apex of tergum VIII); OL/HTL = 2.42 (2.0–2.8) ($n = 15$).

Male. As in female except as follows: Body less elongate, 0.4–0.6 mm; HTL = 0.17 (0.14–0.20) mm ($n = 9$); metasoma of similar width throughout, apex truncate, not attenuate; metasoma shorter, length equal to or only slightly greater than that of mesosoma. Antenna with pedicel slightly longer, 0.6–0.7 scape length; club without an apical process and with fewer PLS (one present or absent from C1, one on C2, two on C3); club shorter due to absence of apical process, C3 ca. $1.25\times$ length of C1. Forewing with longer fringe, longest setae ca. 0.25 width of wing. Genitalia 0.49 (0.46–0.53) ($n = 5$) length of hind tibia; genital capsule 0.34 (0.3–0.40) ($n = 8$) as wide as long (Fig. 14).

Types.—Holotype ♀, allotype ♂. UNITED STATES. *California*: Riverside Co.; Santa Rosa Plateau Ecological Reserve; $33^{\circ}32.538'N$, $117^{\circ}14.758'W$; vii-30/viii-14-2001; Malaise trap #1; PEET Survey; deposited in the National Museum of Natural History, Washington, DC. Paratypes designated as follows: 4 ♀ (data as holotype); 3 ♂, 6 ♀ (data as holotype except— $33^{\circ}32.489'N$, $117^{\circ}14.652'W$; Malaise trap #3); 1 ♀ (data as holotype except— $33^{\circ}32.524'N$, $117^{\circ}14.644'W$; Malaise trap



Figs. 3-8. *Nicolavespa*. 3, *N. luiseno*, head. 4-7, *N. theresae*, antenna. 4, Medial view (♀). 5, Anellar and funicular segments (medial, ♀). 6, Apex of club showing apical process and UPP sensillum inserted at apex (♀). 7, Medial view (♂). 8, *N. luiseno*, mesosoma (♀).

#2). Paratypes deposited in The Natural History Museum, London; the Canadian National Collection, Ottawa; the University of California, Riverside (Department of Entomology); and the University of Naples, Portici. All except three paratypes mounted on slides in Canada balsam. Chaparral vegetation characterizes the type locality.

Etymology.—Named for my mother, Theresa Aloisio Pinto.

Geographic distribution.—A widespread species. Known from California, Texas and eastern United States, south to the Turks and Caicos Islands, and Costa Rica.

Variation.—Color varies geographically in *N. theresae*. Unfortunately, this variation

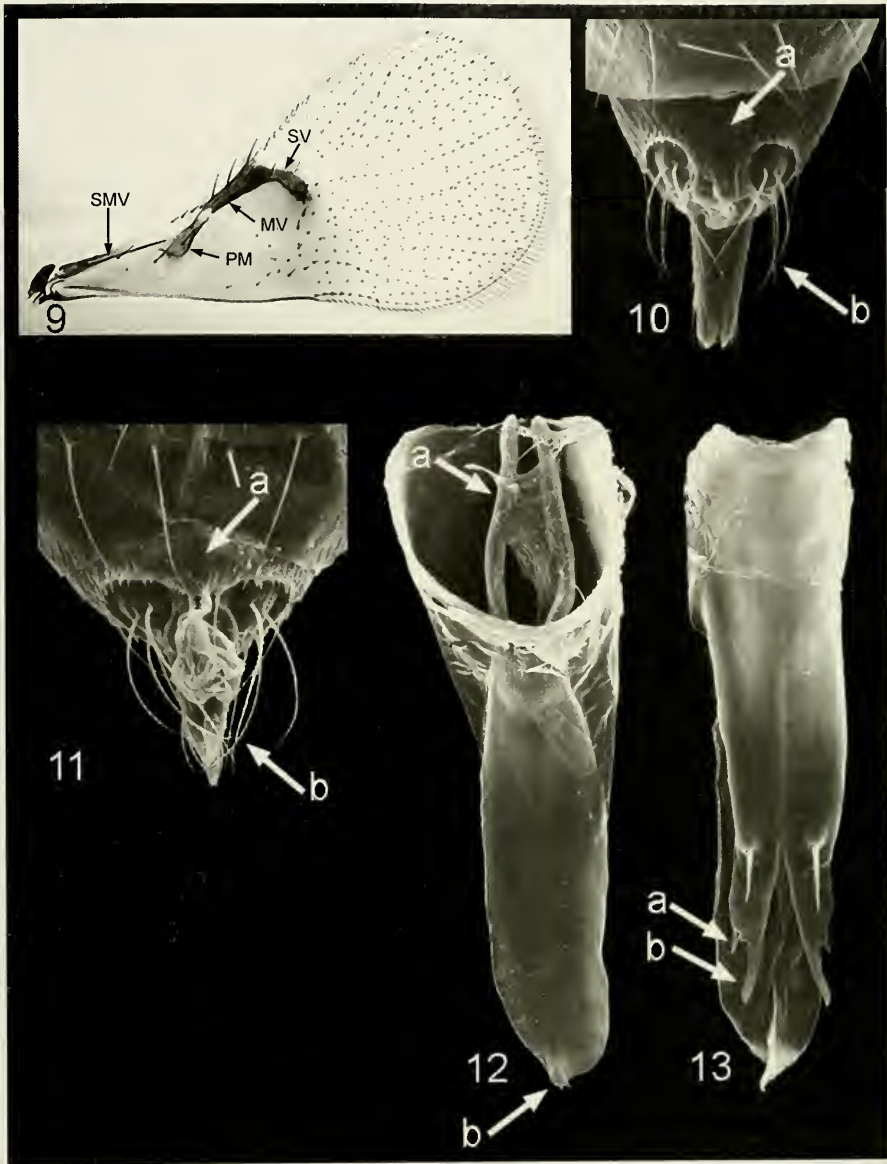
could be adequately examined only in the minority of specimens mounted on cards. The most obvious variation is in the color of the midlobe of the mesoscutum. Specimens from southern California are darkest, with a homogeneous dark brown mesoscutum. Northern California material (Solano Co.) also are dark but most specimens have a pair of narrowly separated, yellow-brown vittae in the anterior half of the disk; the non-vittate area of the disk also is a lighter brown than the general surface color in southern California material. The scutal vittae are absent in specimens from western Texas but present in all material examined east of there (eastern Texas, Illinois, South Carolina, Maryland). Specimens from Guatemala are similar to eastern U.S. specimens except that the head below the eyes also is lighter. Material from Costa Rica and Chiapas is lightest. In these specimens the dorsum of the mesosoma is almost entirely yellowish; a single Costa Rican specimen, however, is darker, similar to those from Guatemala. The head below the eyes also is lighter in Costa Rican specimens. Carded material from intermediate areas in Mexico was not available for study.

The range of variation in ovipositor length is considerable in this species (see above). Specimens with the shortest ovipositor are found in the southern part of the range. The average OL/HTL ratio is 2.4. In certain specimens from the south (e.g., Guerrero, Turks and Caicos Islands) the ratio is 2.0 or only slightly greater. Variation is not obviously geographically clinal however, since in Costa Rica, the southern-most region of distribution, the ovipositor is relatively long (OL/HTL = 2.3–2.7, $n = 3$).

The length of the forewing fringe setae may also vary geographically. In specimens from the United States the longest fringe setae are 0.15× the wing width or less. In Mexico and Central America the fringe setae are longer, ca. 0.2× the wing width.

Material studied.—41 ♂ (17 on slides), 77 ♀ (36 on slides) as follows: COSTA RICA. *Alajuela*: PN Arenal (La Peninsula,

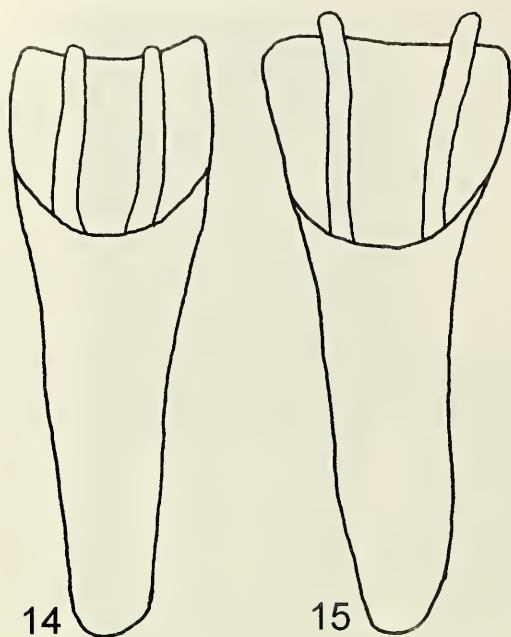
600 m), 10°27'N, 84°45'W; ii-25-03; sweep; 3 ♀; J. Noyes. PN Arenal (Sendero Pilón, 600 m) 10°27'N, 84°43'W; ii-26-03; sweep; 2 ♀; J. Noyes. Reserva Rincon Forestal (Est. Caribe, 400 m); 10°53'N, 85°18'W; ii-19/20-03; 1 ♀; J. Noyes. *Heredia*: Puerto Viejo, 3 km S (OTS—La Selva, 100 m); ix-92; 1 ♀; P. Hanson. *Puntarenas*: Golfo Dulce, 3 km SW Rincon de Osa (10 m); ix/xi-89; 1 ♀; P. Hanson. R. F. Golfo Dulce; 24 km W Piedras Blancas (200 m); iv/v-92, xii-92, viii/ix-93; 3 ♀; P. Hanson. GUATEMALA. Petén (2.0 km E Tikal); xii-27-88; 4 ♂, 3 ♀; J. LaSalle. MEXICO. *Chiapas*: Ocozocoautla (El Aguacero, 1,800'–2,000'); viii-8-90; 1 ♀; J. Woolley. *Guerrero*: Acapulco, 30 km N; viii-6-84; sweep; 1 ♀; G. Gordh. Xochipala, 6.2 mi. SW; vii-13-85; 2 ♀; J. Woolley/G. Zolnerowich. *Jalisco*: Guadalajara, 17 mi. N; vii-6-84; 1 ♂, 1 ♀; J. Woolley. *Morelos*: Tlayacapan; x-29-82; sweep; 1 ♂; A. Gonzalez. *Sinaloa*: Villa Union, 5.5 mi. E (on Durango Hwy); ix-3-88; sweep; 1 ♀; A. Sanders. TURKS AND CAICOS ISLANDS. Country record only; iii-17/24-91; pan trap; 1 ♂, 2 ♀; S. Rigby. UNITED STATES. *Arizona*: Patagonia (Santa Cruz Co.); vi-16-1994; Malaise trap; 1 ♂; E. Wilk/B. Brown. *California*: Altadena; viii/ix-91; 1 ♀; R. Crandall. Santa Rosa Plateau Ecological Reserve (Riverside Co.); 4 ♂, 12 ♀; (see Types). San Pedro (Defense Fuel Support Point) (Los Angeles Co.); 13°46'N, 118°18'W; v-26/vii-6-02, vi-6/viii-18-02; Malaise trap in coastal sage scrub; 5 ♂, 3 ♀; J. George. Winters, 11 km W (Cold Canyon Reservoir) (Solano Co.); viii-1/15-94; Malaise trap in live oak woods; 24 ♂, 22 ♀; L. Kimsey. *Georgia*: Sapelo Island; ix/xi-19-87; flight intercept trap; 1 ♀; BRC Hymenoptera Team. *Illinois*: Centralia (Carl Hall Park); ix-7-93; sweep at edge of woods; 1 ♀; J. Pinto. Chicago (Indian Boundary Forest Preserve); viii-24-83; sweep in deep woods; 2 ♀; J. Pinto. *Maryland*: Patuxent Research Station (Prince Georges Co.); vii-27/viii-3-86, viii-3/9-86; Malaise trap; 3 ♀; D. Wahl. Port Republic; viii/ix-86; flight in-



Figs. 9–13. *Nicolavespa*. 9, Forewing, *N. theresae* (veins as follows: SMV = submarginal, PM = pre-marginal, MV = marginal, SV = stigmal). 10–11, Metasomal tergum VIII (dorsal, ♀). 10, *N. theresae* (arrow 'a' at tergum VIII, arrow 'b' at cercal setae). 11, *N. luiseno* (arrows 'a' and 'b' as in Fig. 10). 12–13, *N. theresae*, ♂ genitalia. 12, Dorsal view (arrow 'a' at apodeme of aedeagus, arrow 'b' at bifid protrusion at apex). 13, Ventral view (arrow 'a' at presumed digital spine, arrow 'b' at apex [digitus?] of volsella).

tercept trap; 1 ♀; M. Sharkey/Munroe. *Oklahoma*: Red Oak (Latimer Co.); ix-93; flight intercept trap; 1 ♀; K. Stephan. *South Carolina*: Pendleton (Tanglewood Spring, 225 m); 34°39'N, 82°47'W; vii-30/viii-20-87, ix-15/30-87; Malaise trap; 3 ♀; J.

Morse. *Texas*: Bastrop State Park; x-7/21-90, x-21/29-90; 2 ♀; R. Wharton. Big Bend Ranch (Presidio Co.); 29°29'40"N, 104°06'00"W; x-27/xi-1-89; 1 ♀; D. Judd. Big Bend Ranch; 29°27'30"N, 104°01'04"W; x-28/x-1-89; Malaise trap



Figs. 14–15. *Nicolavespa* ♂ genitalia (dorsal). 14, *N. theresae*. 15, *N. luiseno*.

“nr. fl. composite” 1 ♀; D. Judd. Big Bend Ranch SNA (La Saucedo, 3.5 mi. SE) (Presidio Co.); vi-18/23-90; yellow pan trap; 1 ♀; J. Woolley/G. Zolnerowich. Rio Grande State Park (Singing Chaparral Trail); vi-19-86; 1 ♀; J. Woolley.

Comments.—The separation of *N. theresae* from *N. luiseno* is based primarily on ovipositor length, length of the last metasomal tergum in females, and relative proportions of the male genital capsule. Details are given below.

The single male from Patagonia, Arizona, is questionably placed here. Its larger size (HTL = 0.19 mm) suggests *N. theresae*. The genital capsule is not positioned adequately for measurement.

***Nicolavespa luiseno* Pinto, new species**
(Figs. 2–3, 8, 11, 15)

Description.—As in *N. theresae* except as follows: Female. Smaller, body length 0.55 (0.5–0.7) mm (n = 11); HTL = 0.19 (0.18–0.21) mm (n = 9); metasoma length (excluding slight ovipositor extension) less

than 1.50× that of metasoma; metasoma more abruptly narrowed posteriorly, not gradually narrowing and attenuate in apical half. Color within range of variation of *N. theresae* (see Variation). Forewing fringe setae somewhat longer, longest 0.20 (0.16–0.23) (n = 7) wing width. Last tergum of metasoma (Fig. 11) considerably shorter, less than a third as long as wide, with cercal setae reaching apex of ovipositor. Ovipositor much shorter (Fig. 2), only occupying ca. half length of metasoma (in slide-mounted specimens ovipositor length is ca. half length of metasoma to apex of tergum VIII); OL/HTL = 1.60 (1.6–1.7) (n = 8).

Male. Body length 0.35 mm (n = 2). HTL = 0.14 (0.13–0.17) mm (n = 5). Genitalia length 0.48 (0.4–0.5) (n = 5) that of hind tibia; genital capsule wider, 0.43 (0.41–0.45) (n = 5) as wide as long (Fig. 15).

Types.—Holotype ♀, allotype ♂. UNITED STATES. *California*: Riverside County; Menifee Valley (hills on W side); 33°39'N, 117°13'W; 1,800' el.; vi-14/28-1995; Malaise trap; John D. Pinto, collector; deposited in the National Museum of Natural History, Washington DC. Six ♀ and 5 ♂ with same data as holotype designated as paratypes. Paratypes deposited in The Natural History Museum, London; the Canadian National Collection, Ottawa; the University of California, Riverside (Department of Entomology); and the University of Naples, Portici. All types are on slides, mounted in Canada balsam. Mixed chaparral and coastal sage scrub vegetation characterizes the type locality.

Etymology.—Luiseño, the aboriginal people originally inhabiting the known range of this species in Riverside Co.

Geographic distribution.—Known from three localities in southern California.

Material examined.—20 ♂ (18 on slides), 97 ♀ (45 on slides). UNITED STATES. *California*: Granite Mountains Reserve, Granite Cove (4,200') (San Bernardino Co.); 34°48'N, 115°39'W; v-14/17-1994; flight intercept trap; 1 ♀; J. Pinto/G.

Platner. Lake Skinner, NE of (ca. 1,570') (Riverside Co.); 33°36'N, 117°02'W; iv-24/v-8-97, v-7/21-96, v-8/22-97, v-21/vi-5/96, v-22/vi-5-97, vi-4/18-96, vi-16/30-98, vi-18/vii-2-96, vi-18/vii-2-98, vii-16/30-98, xi-6/20-97, xi-20/xii-4-97; Malaise traps in coastal sage scrub; 5 ♂, 45 ♀; J. Pinto. Menifee Valley (hills on W side, 1,800') (Riverside Co.); 33°39'N, 117°13'W; iv-30-96, vi-7/13-95, vi-14/28-95, vi-20/vii-12-95, vi-28/vii-12-95, vii-12-95, vii-19/viii-1-95, viii-1-95, x-18/xii-2-95; Malaise traps in mixed chaparral/coastal sage scrub; 15 ♂, 50 ♀; J. Pinto (see Types).

Comments.—*Nicolavespa luiseno* is very similar to *N. theresae*. It is separated by its shorter ovipositor and less obviously attenuate metasoma (cf. Figs. 1–2). In *N. luiseno* the ovipositor is considerably less than twice the length of the hind tibia. In *N. theresae*, its length is twice or more the hind tibial length. Also the length of metasomal tergum VIII is considerably greater in *N. theresae* than in *N. luiseno* and tergal shape differs as well (cf. Figs. 10–11). Males are difficult to separate. The only difference I have found is the greater width/length ratio of the genital capsule in *N. luiseno* (see above and cf. Figs. 14–15).

Treating *Nicolavespa luiseno* as a species rather than a race of *N. theresae* was a difficult decision. Arguing for species treatment is the occurrence of both forms in similar habitats (chaparral and coastal sage scrub) and in close proximity in southern California (within 15 km of each other), as well as the absence of character overlap throughout the range of both. Interestingly, material of *N. theresae* from southern Mexico and Central America most closely approaches *N. luiseno* with regard to ovipositor length, body size and forewing fringe length. Unfortunately, relatively few specimens are available from this area, and little material has been collected from intermediate regions of northern and central Mexico.

Nicolavespa can be relatively abundant in certain localities of southern California.

More extensive collecting is required to determine if the two species are syntopic.

Haeckeliana Girault

Haeckeliana Girault 1912: 97. Type species: *Haeckeliana haeckeli* Girault, by original designation.

Diagnosis.—Female. Antenna (Fig. 18) with two anelli and a five-segmented club; club widest at C1, C1 subequal in length to C2 or somewhat shorter but never anelliform, with at least some PLS separated from surface for much of their length; club often terminating in an apical process. Maxillary palp two-segmented (Fig. 17). Forewing relatively broad (Fig. 26), length of venation usually less than half that of wing; MV gradually broadened to apex and ending abruptly at juncture with SV; SV well developed, shorter than MV; PM slightly shorter to, more commonly, slightly longer than MV, angled posteriorly from MV to form a well-developed costal cell. Forewing disk in almost all species with distinct longitudinal setal tracks including an RS1. Midlobe of mesoscutum and scutellum each with two pair of setae (Fig. 24); notauli usually broadly emarginate. Dorsum of first metasomal tergum (petiolar segment) traversed by a row of erect, sharply pointed denticles (Fig. 25).

Male. As female except antenna with all PLS attached to surface at base only, setiform (Fig. 22). Genitalia as in Trichogrammatini (*sensu* Viggiani 1971) (Figs. 29–31), with a distinct aedeagus, parameres and volsellae; aedeagus often longer than genital capsule; genital capsule open its entire length on dorsal surface.

Remarks.—*Haeckeliana* males were unavailable to Viggiani (1971, 1984) for his classification of Trichogrammatidae based on male genitalia. The discovery of males (Pinto 1997) clearly places the genus in his Trichogrammatini (Trichogrammatinae). This is an assemblage of basal genera, probably paraphyletic, in which the aedeagus and genital capsule are separate (Vig-

giani 1971). Within this group *Haeckeliana* is phenetically most similar to *Ophioneuris*, *Hispidophila* and *Brachyufens* (see Douth and Viggiani 1968 for separation; also see Pinto 1997 for separation from other North American genera). The presence of a transverse row of denticles on the petiolar segment (Fig. 25), a feature not previously noted in the Trichogrammatidae, is not unique to *Haeckeliana* but characterizes several other Trichogrammatini genera (*Trichogramma*, *Trichogrammatoidea*, *Paratrichogramma*, *Australufens*, *Xenufens*, *Trichogrammatomyia*, *Brachyufens*, *Brachyia*, *Soikiella*). The structure is not known to occur in the other tribes of the family.

The form of antennal sexual dimorphism in *Haeckeliana* is uncommon in the Trichogrammatidae. Although basic structure is similar in both sexes (five club segments, funicle absent), the surface of the flagellar segments in males is dominated by elongate, setiform PLS (Fig. 22). In females there are fewer PLS and most are attached to the surface for much of their length (Fig. 18). Similar surface ultrastructure of these sensilla in the two sexes indicates homology. In both, the surface is longitudinally grooved with numerous pores. In this way they are easily distinguished from the relatively smooth FS, the only other setiform sensilla of equivalent length on the antennae of Trichogrammatidae (Fig. 21). Numerous setiform PLS also occur on the antenna of *Soikiella* and *Trichogrammatoidea* males (Velten and Pinto 1990, Pinto 1999).

Eight species of *Haeckeliana* have been described to date (Noyes 2001). This includes four from Australia, three from Asia and only a single species, *H. minuta* Viggiani, from the New World. This modest number fails to adequately portray the diversity of the genus. The examination of collections of Trichogrammatidae from throughout the world suggests that *Haeckeliana* is one of the largest genera in the family. It is likely that no more than 5–10% of the fauna is described. It is particularly diverse and abundant in Australasia and the

New World tropics. It also occurs in Africa and Asia. The genus has yet to be recorded from Europe, and I am aware of only two or three undescribed species in the United States.

Most species of *Haeckeliana* are uniformly dark brown in color, compact and gibbous in shape. In this section of the genus the metasoma is broadly rounded apically and subequal in length to the mesosoma. *Haeckeliana minuta*, described from Brazil by Viggiani (1992), belongs to this section. *Haeckeliana sperata*, described below, represents a less common phenotype characterized by a lighter body color (generally light yellow or yellow orange, and marked with brown), and a more slender, apically attenuate, and elongate body (metasoma clearly longer than mesosoma). *H. sperata* is the only species of this type formally recognized to date but additional undescribed New World species have a similar facies.

Haeckeliana sperata and a few other undescribed New World species are known to parasitize the eggs of Curculionidae.

Haeckeliana sperata Pinto, new species (Figs. 16–27, 29–31)

Description.—Female. Body relatively narrow, elongate, length 0.5 (0.5–0.6) mm ($n = 9$); metasoma 1.4–1.5 \times length of mesosoma, attenuate to apex. *Color*: Largely yellow orange with pronotum brown; metasomal terga II–IV predominantly brown, suffused with yellow, more apical terga brown along lateral margins only; legs and head beneath eyes light yellow; antenna with scape and pedicel light yellow, flagellum light yellow brown. *Head*: Toruli placed above ventral margin of eyes (Fig. 16). Antenna with length/width ratio of scape, pedicel and club 2.3–1.2–3.6; scape moderately wide its entire length, ca. 1.6 \times length of pedicel; pedicel bead shaped, its surface weakly ridged transversely; club subconical, its length 1.3–1.4 \times that of scape and pedicel combined, C1 articulation point with anelli acentric; club widest



Figs. 16–23. *Haeckeliana sperata*. 16, Head. 17, Maxilla (venter). 18–23, Antenna. 18, ♀ (lateral). 19, First anellar segment and base of club (♀, lateral) (second anellar segment not visible in lateral view). 20, Club apex ♀ (arrow at apical process with setiform UPP sensillum inserted at apex, lateral). 21, Antennal sensilla (♀) (arrow 'a' at placoid sensillum [PLS]: surface grooved and pitted; arrow 'b' at flagelliform seta [FS]: surface appearing smooth). 22, ♂ (medial). 23, Club apex ♂ (as in Fig. 20, except medial).

at C1 and C2, gradually tapering to apex with an elongate apical process; C1 and C2 subequal in length, C3–C5 increasingly elongate, C5 ca. 3× the length of C1 with apical process comprising ca. $\frac{1}{3}$ its length. PLS characteristics and distribution on club as follows: C1 with one PLS curving from basal to dorsal surface, its apical third extending beyond surface; C3 and C4 each with two PLS, one extending entire length of segment with apical third or more separated from surface, the other setiform, attached only at base; C5 with three-four PLS, one extending entire length of segment with only apical fourth free of surface, the other two attached at base only and extending well beyond tip of apical process. Other structures on antennal club include at least one large subglobose BPS at apex of each segment; one APB near base of C1, near apex of C3 and just below apex of apical process; a few FS on C3–C5; several APA on C1–C3; and a setiform UPP inserted at tip of apical process (this sensillum subequal in length to that of apical process itself). Mandible with two strong basal teeth and one or two weaker teeth apically. Maxillary palp with segment II ca. half length of I, apical sensillum slightly longer than II.

Mesosoma: Midlobe of mesoscutum 1.2× as long as scutellum; dorsum of mesosoma weakly sculptured, surface divided into elongate reticulae, reticular spaces narrower on scutellum. Propodeal disk elevated, slightly produced, arcuate posteriorly, slightly longer than metanotum. Forewing 0.55× as wide as long, fringe setal length 0.15–0.17× wing width, venation extending almost to half length of wing; PM slightly shorter or subequal in length to MV, both veins of similar width, two PM campaniform sensilla well separated from one another; SV ca. 0.8 length of MV; disk with ca. 17 longitudinal setal tracks, most setae associated with a track; costal cell with 5–8 setae on ventral surface.

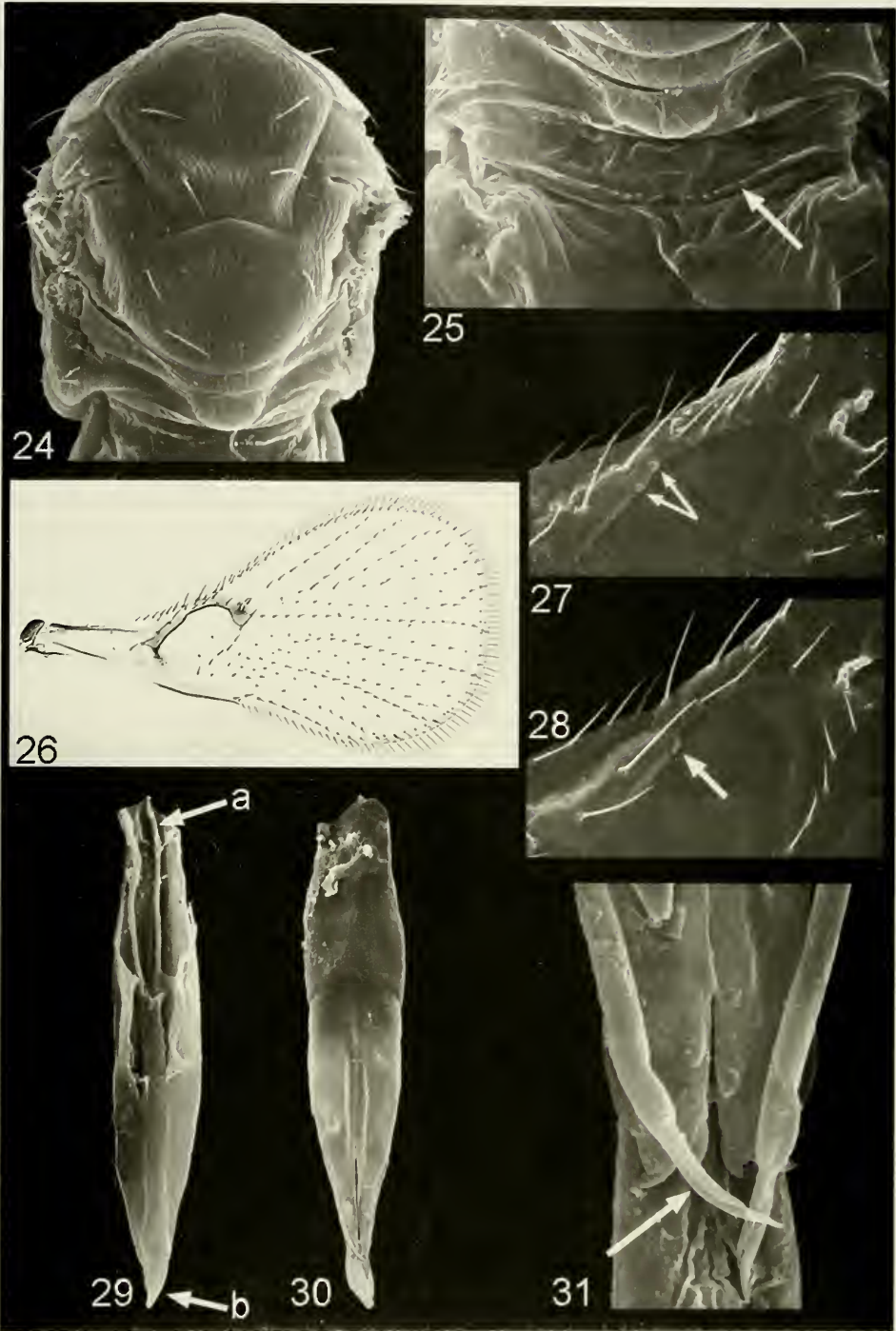
Metasoma: Ovipositor extending only slightly beyond apex of metasoma; OL/

HTL = 2.1–2.4 (n = 6) (HTL of measured specimens = 0.15–0.17 mm); gonoplac comprising ca. $\frac{1}{5}$ length of ovipositor; gonopophyses extending slightly anterior to gonangulae.

Male. As in female except metasoma with minimal dark coloration (almost entirely orange) and broadly rounded apically, not attenuate; also, characteristics of antenna differ as follows: club narrower and longer, 4.8–5.2 (n = 2) as long as wide, ca. 1.6× length of scape and pedicel combined, segments more loosely articulated, with a longer and more broadly based apical process comprising almost half length of C5 (see below); PLS all modified into setiform structures, attached to surface at base only (4, 4, 3, 2, 3 in number on C1–C5, resp.), longest ca. 3× greatest club width; APB absent from C1 and C2; surface without APA; FS on C4 only, 2 in number; apical process with a very long spinelike sensillum at apex (= UPP?) subequal in length to that of C5 itself.

Genital capsule elongate, basal section very poorly sclerotized and difficult to discern in slide-mounted material; aedeagus slightly longer than capsule and 1.2× length of hind tibia; apodemes comprising ca. 0.4 total aedeagal length; parameres and volsellae extending to same level at apex of capsule; parameres bifid apically; intervolcellar process absent.

Types.—Holotype ♀, and allotype ♂. DOMINICA. Grand Bay, Agricultural Station; i-6-2004; ex. *Diaprepes* eggs on *Citrus*; N. Commodore; deposited in the National Museum of Natural History, Washington, DC. Paratypes include 6 ♂ and 27 ♀, data same as holo- and allotype; deposited in the Canadian National Collection, Ottawa; The Museum of Natural History, London; the Florida State Collection of Arthropods, Gainesville; and the University of California, Riverside (Department of Entomology). All types except 1 ♂ and 6 ♀ paratypes are mounted on slides in Canada balsam. All type material emerged from the same host egg mass.



Figs. 24–31. *Haeckelia*. 24–27, *H. sperata*. 24, Mesosoma. 25, Base of metasoma (arrow at row of denticles on petiolar segment). 26, Forewing. 27, Venation of forewing (dorsal) with arrows at disjunct campaniform sensilla at apex of premarginal vein. 28, *Haeckelia* sp., as in Fig. 27, except the two campaniform sensilla at apex of premarginal vein adjacent (see arrow). 29–30, *H. sperata*, ♂ genitalia. 29, Dorsal (arrow 'a' to aedeagal apodeme at base, arrow 'b' to apex of aedeagus). 30, Venter. 31, Detail of apex (ventral), with arrow to apically bifid paramere (note volsellar digital spines beneath [dorsal to] parameres).

Etymology.—*Sperata* (Latin: hoped for).

Geographic distribution.—Known only from Dominica and Costa Rica. Targeted for possible release in Florida (Jorge Peña, personal communication).

Material examined.—11 ♂ (10 on slides), 43 ♀ (32 on slides). COSTA RICA. *Allajuela*: PN Arenal, La Peninsula (600 m); 10°27'N, 84°45'W; ii-25-2003; sweep; 1 ♀; J. Noyes. DOMINICA. Grand Bay, Agricultural Station (see types); 7 ♂, 28 ♀. Grand Bay; iv-20 & iv-28-2003; ex *Diaprepes* sp. eggs on *Citrus* sp.; 1 ♂, 10 ♀; J. Peña/C. McCoy/R. Hill. "Syndicate & Grand Bay"; iv-29-2003; ex *Diaprepes* sp. or *Pachnaeus* eggs on *Citrus* sp. 3 ♂, 4 ♀; J. Peña, et. al.

Comments.—As already summarized, *Haeckeliana sperata* is distinguished from the vast majority of congeners by the lighter body color, and its relatively slender body. These features also distinguish it from *H. minuta*, the only other member of the genus described from the New World (Viggiani 1992). Whereas most *Haeckeliana* are entirely brown and robust, in *H. sperata* the mesosoma is predominantly yellow orange, as is much of the metasoma, and its body shape is relatively slender. In addition, in the majority of *Haeckeliana* the marginal vein is somewhat shorter and wider than the premarginal vein. In *H. sperata* the two veins are similar in length and width.

A small number of undescribed New World species have a facies similar to *H. sperata*. The following combination of characters will separate *H. sperata* from these: Forewing with the two campaniform sensilla on PM distinctly separated from one another (Fig. 27); metanotum slightly shorter than propodeal disk (Fig. 24); female antennal club with a setiform apical sensillum (UPP) (Fig. 20); ovipositor length between 2 and 2.5× as long as hind tibia; male antennal club with an apical process (Fig. 23). In one presumably close relative of *H. sperata* from Central America the campaniform sensilla are similarly disjunct but the sensillum inserted at the apex of the

apical process in females is much more robust, cylindrical in shape, and truncate at its apex. Another Central American and Caribbean species has an extremely long ovipositor (ca. 3.5× as long as its hind tibia).

Two females from Florida (Gainesville and Covington) and several from Chiapas appear to represent a species closest to *H. sperata*. The primary differences are color (see below), the contiguous campaniform sensilla on the PM (as in Fig. 28), a longer metanotum (1.5–2× length of propodeal disk), and an apically truncate rather than attenuate apical sensillum on the club. Clearly associated males are unknown.

All similar species are separable from *H. sperata* by color. In *H. sperata* the light-colored areas are deep yellow orange; in related species they are light yellow. Also, the dorsum of the metasoma in females of *H. sperata* is brown basally but suffused with yellow orange, and the apical terga are predominantly yellow orange with brown lateral markings. In similar forms all except the apical two metasomal terga are uniformly brown and the apical ones are entirely light yellow.

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